UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/562,438	12/28/2005	Kaoru Inoue	043888-0428	3628

20277 7590 12/15/2006

MCDERMOTT WILL & EMERY LLP
600 13TH STREET, N.W.
WASHINGTON, DC 20005-3096

EXAMINER	
LEWIS, BEN	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 12/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/562,438	Applicant(s) INOUE ET AL.	
	Examiner Ben Lewis	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 11-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 11-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 December 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 11-16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami et al. (U.S. Patent No. 6,395,423 B1) in view of Sun (U.S. Pub. No. 2003/0152828A1) and further in view of Kotato et al. (U.S. Pub. No. 2004/0101763A1).

With respect to claim 1, 12 and 15 Kawakami et al. disclose secondary battery comprising a negative pole, a separator, a positive pole, an electrolyte and a collector (Col 6 lines 24-30).

Regarding a non aqueous electrolyte, Kawakami et al teach that the electrolyte is made of an acid, a salt composed of Lewis acid ion or their mixture. It is preferable that the foregoing salt is heated under lowered pressure to sufficiently dehydrate and deoxidize the salt. The electrolyte contains a solvent. It is preferable that the solvent be dehydrated "non-aqueous". As it is preferable that the solvent be distilled under presence of alkaline metal in inactive gas to remove impurities and to be dehydrated (Col 20 lines 1-35).

Regarding an insulative film, Kawakimi et al teach that, covering the surface of the positive pole **104** of the battery with a film **12101** which is made of an insulating material or a semiconductor through which ions relating to the battery reactions can be passed, dendrite of lithium or zinc grown from the negative pole **101** through the separator **108** during the repetition of the charge and the discharge are not substantially brought into contact with the conductor or a collector in the positive pole **104** (Col 20 lines 25-36). Kawakimi et al also teach that the surface of the negative pole **101** is covered with the film **102** prevents direct contact between the precipitated lithium and the electrolytic solution. Therefore, the generation of dendrite, which causes the battery short circuit to occur, can be prevented (Col 6 lines 45-65).

Regarding an inorganic oxide filler, Kawakimi et al teach that the surface of the negative pole activating material is covered with a film having an inorganic glass structure, through which ions for use in the reactions in the battery can be passed, the reactions between lithium and water or oxygen can be prevented, causing easiness in handling if the negative pole activating material is lithium. The foregoing inorganic glass may be made any one of a metal oxide selected from a group consisting of silica, titanium oxide, alumina, zirconia oxide, magnesium oxide, tantalum oxide,molybdenum oxide, tungsten molybdenum, tin oxide, indium oxide, iron oxide, chrome oxide, aluminum phosphate, iron phosphate, silicon phosphate and their mixtures. In particular, it is preferable to employ silica, titanium oxide, alumina, zirconia oxide or aluminum phosphate (Col 8 lines 1-25).

Regarding a film binder, Kawakimi et al teach that, the surface coating of the negative pole activating material is formed in a manner comprising steps of directly applying the foregoing colloid solution, or applying a solution, in which a monomer or an organic polymer or both organic polymer and a crosslinking material "binder" are dissolved in the colloid solution, and polymerizing it or drying and hardening it. The organic polymer for combining the organic polymers is exemplified by epoxy resin, polyester, polyimide, polyethylene, polypropylene, polyurethane, polystyrene, polyethylene glycol, nylon, fluorine resin and silicon resin. The polymer crosslinking material is exemplified by diisocyanate, polyisocyanate prepolymer, block isocyanate, organic peroxide, polyamine, oxims, nitroso compound, sulfur or sulfur compound, selenium, magnesium oxide, lead oxide and zinc oxide. As an alternative to using the crosslinking material, a method may be employed in which radial rays or electron rays or ultraviolet rays are applied to polymerize or crosslink the polymer (Col 8 lines 25-67).

Regarding the film being porous, Kawakimi et al teach that the optimum thickness of the film differs depending upon the density or the porosity of the film and considerably differs depending upon the type of the electrolytic Solution (Col 9 lines 10-20). Kawakimi et al. is silent as to the porosity of the insulative film, however Sun discloses a lithium-ion battery using heat-activatable microporous membrane (title) wherein, the microporous membrane "insulative film" further comprises a particulate filler. The filler is preferably selected from the group consisting of fumed silica, alumina, titanium dioxide, molecular sieve, calcium carbonate, calcium silicate, glass, ceramic

material and polytetrafluoroethylene each in the form of fine powder, and combinations thereof (Paragraph 0025). The microporous membrane “insulative film” preferably has a porosity from about 25 to about 75% and more preferably from about 45 to about 70%. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to make an insulative film with the porosity of Sun in the film forming process of Kawakimi et al because Sun teach that the higher porosity of the microporous membrane can result in higher charge-discharge rate capability of battery (Parargraph 0062).

Regarding the separator porosity, Kawakimi et al. as modified by Sun teach that since the electrolytic solution of the alkali-zinc secondary battery is a water-type solvent, a hydrophilic separator must be used which is exemplified by a non-woven fabric or a micropore structure of nylon, polypropylene or hydrophilic polypropylene (Col 21 lines 30-40). Kawakimi et al. as modified by Sun is silent to the porosity of the separator. However, Kotato et al. disclose a non-aqueous electrolytic secondary battery and as separator **2**, a porous separator can be used. As a material for the porous separator, a microporous film comprised of polyethylene, polypropylene, an ethylene-propylene copolymer, or an ethylene-butene copolymer; or woven fabric, nonwoven fabric containing fibers of these materials can be used (Paragraph 0036). The separator preferably has a porosity in the range of from 30 to 60%, more preferably 35 to 50%. When the porosity of the separator falls in the above range, excellent electrolytic solution holding properties can be obtained, and further a satisfactory separator strength can be secured (Paragraph 0038). Therefore it would

have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate a separator with porosity of Kotato et al. into the battery of Kawakimi et al as modified by Sun because Kotato et al. teach that excellent electrolytic solution holding properties can be obtained, and further a satisfactory separator strength can be secured (Paragraph 0038)

With respect to the poresize, Sun teach that the pore size of the microporous membrane "insulating film" is 0.43μm. (Paragraph 0062) (See Table 2).

With respect to the amount of film binder contained in the porous insulating film, Sun teach that the hot-melt adhesive "binder" is present in an amount of from about 2 to about 50% by weight, preferably from about 5 to 30%, and more preferably from about 10 to about 15% (Paragraph 0021). microporous membrane further comprises a particulate filler, preferably in an amount of from about 0 to about 50 by weight, more preferably from about 5 to about 30%, and most preferably from about 15 to about 25%.

With respect to the oxide filler and polycrystalline particles, Kawakimi et al teach that, the surface of the negative pole activating material is covered with a film having an inorganic glass structure "polycrystalline", through which ions for use in the reactions in the battery can be passed, the reactions between lithium and water or oxygen can be prevented, causing easiness in handling if the negative pole activating material is lithium. The foregoing inorganic glass may be made any one of a metal oxide selected from a group consisting of silica, titanium oxide, alumina, zirconia oxide, magnesium oxide, tantalum oxide,molybdenum oxide, tungsten molybdenum, tin oxide, indium oxide, iron oxide, chrome oxide, aluminum phosphate, iron phosphate, silicon

phosphate and their mixtures. In particular, it is preferable to employ silica, titanium pxode, alumina, zirconia oxide or aluminum phosphate (Col 8 lines 1-25). Kawakimi et al. also teach that the sol-gel method, which is the typical inorganic coating method at low temperature, must be performed with any particular means. The raw material for the material having the inorganic glass structure is obtained in such a manner that an acid or a base and water are added to a solution of alcohol of an organic metal compound such as a metal alkoxide to hydrolyze the raw material so as to form colloid particles having metal atom-oxygen atom bonds, and then the solvent is substituted by a non-hydric solvent except alcohol (Col 8 lines 25-45).

With respect to claims 12 and 16, these claims are product by process claims. The measurement step of claims 12 and 16, does not further limit the products of claim 12 and 15. MPEP 2113 states, "Even though product-by-process claims are limited by and defined by the process, determination of patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F. 2d 698,227 USPQ 964,966 (Fed Cir. 1985).

With respect to claims 13 and 14, Sun teach that preferably the filler has an average particle size of less than about 50μm, more preferably less than about 25μm, and most preferably less than about 10μm (Paragraph 0025).

With respect to claim 15, this claim is a product by process claim. The formation step of claim 15, does not further limit the product of claim 15. MPEP 2113 states, "Even though product-by-process claims are limited by and defined by the process, determination of patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F. 2d 698,227 USPQ 964,966 (Fed Cir. 1985).

With respect claim 16, Sun teach that the pore size of the microporous membrane "insulating film" is 0.43μm. (Paragraph 0062) (See Table 2).

With respect to claim 11 and 18, Sun teach that the hot-melt adhesive "binder" is present in an amount of from about 2 to about 50% by weight, preferably from about 5 to 30%, and more preferably from about 10 to about 15% (Paragraph 0021). microporous membrane further comprises a particulate filler, preferably in an amount of from about 0 to about 50 by weight, more preferably from about 5 to about 30%, and most preferably from about 15 to about 25%.

3. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawakami et al. (U.S. Patent No. 6,395,423 B1) in view of Sun (U.S. Pub. No. 2003/0152828A1) in view of Kotato et al. (U.S. Pub. No. 2004/0101763A1) as applied to claim 3 above and further in view of Ota et al. (U.S. Patent No. 6,365,300).

With respect to claim 17, Kawakami et al. as modified by Sun and Kotato et al. disclose a lithium battery in paragraph 2 above. They do not specifically teach the roughness of the surface of the electrode. However, Ota et al. discloses a lithium secondary battery (title) wherein, the surface roughness (Rmax) of the negative electrode, also, affects the battery performance considerably. It is desirable that the value of Rmax be not less than 0.01μm and not more than 5μm. If less than 0.01μm good bonding with the electrolytic layer cannot be obtained, resulting in easy separation (Col 10 lines 1-15). Therefore it would have been obvious to use the roughness values of Ota et al. in manufacturing the electrodes of Kawakami et al. as modified by Sun and Kotato et al. because Ota et al. teach that an electrode roughness of 0.01μm and not more than 5μm results in good bonding of the electrolyte layer (Col 10 lines 1-15).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481. The examiner can normally be reached on 8:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ben Lewis

Patent Examiner
Art Unit 1745

PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER